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D E S C R I P T I O N

ELECTRONIC APPARATUS AND CONNECTING MOUNTING FOR ELECTRONIC APPARATUS

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Technical Field

10 The present invention relates to a connecting
system including a connecting mounting and a portable
electronic apparatus detachably installed onto the
connecting mounting, and a connecting system including
an electronic apparatus, a connecting mounting, a
portable electronic apparatus and a data processing
15 apparatus for exchanging data with the portable
electronic apparatus through the connecting mounting,
and further relates to a data processing apparatus and
an operation mode setting method.

Background Art

20 In general, together with a portable electronic
apparatus such as a Personal Digital Assistant (PDA),
an electronic notebook, digital camera, etc., a
connecting mounting so called a cradle is used to
charge its built-in rechargeable battery and/or to
25 exchange data with an external personal computer (PC).
The conventional cradle has a holding body for holding
the electronic apparatus and further has a connector on
its holding body to be connected with a connector of
the electronic apparatus. The rechargeable battery of

the electronic apparatus is charged while the electronic apparatus is held by the cradle. The cradle, which is used for exchanging data between the electronic apparatus and an external apparatus such as the personal computer (PC), has a USB or RS-232C connector on its holding body in addition to the connector set forth above, to be connected with the personal computer though a connecting cable.

In the well known connecting system including the cradle and the electronic apparatus, when a digital camera having plural operation modes for exchanging data with the personal computer is turned on with the same installed on the cradle, a previously set communication mode rises up automatically to start the operation. For instance, such connecting system is disclosed in Japanese laid-open patent application No. 2002-218300 (Page 8, FIG. 9).

However, in the connecting system including the cradle and the electronic apparatus as set forth above, when a user wants to transfer data from the digital camera to the personal computer, he or she is required to previously set the digital camera in his/her desired communication mode. Further, since the conventional digital camera has various parameters and setting items to be set by the user, the user is required to do troublesome manipulations to select his/her desired mode from among plural communication modes included in

the communication mode, after the communication mode has been set.

Therefore, even though the user can start up the communication mode simply by turning the power on with the digital camera installed onto the cradle, the user is still required to do troublesome preparation operation before he/she uses his/her desired communication function.

The present invention has been made to solve the problems set forth above. It is an object of the present invention to provide a connecting system, an electronic apparatus, and a mode setting method for improving operability in using a certain function when the electronic apparatus is mounted on the connecting mounting, and a connecting system, an electronic apparatus, a connecting mounting, a data processing apparatus and an operation mode setting method for improving operability in using data created by the electronic apparatus.

Disclosure of Invention

According to one aspect of the invention, there is provided a connecting system which comprises an electronic apparatus, a connecting mounting electrically connected to the electronic apparatus, a holding unit mounted on the connecting mounting, which is capable of holding the electronic apparatus with a part of the electronic apparatus facing a direction and also

holding the electronic apparatus with the part of the electronic apparatus facing another direction, a judging unit included in the electronic apparatus, which judges a direction relative to the holding unit which the part of the electronic apparatus held by the holding unit faces, and a mode setting unit included in the electronic apparatus, which sets the electronic apparatus in an operation mode corresponding to the direction of the part judged by the judging unit.

10 According to another aspect of the invention, there is provided an electronic apparatus which is mounted on a connecting mounting and electrically connected to the connecting mounting, and which electronic apparatus comprises connecting terminals
15 corresponding to connecting terminals of the connecting mounting and connected to the connecting terminals of the connecting mounting, when the electronic apparatus is mounted on the connecting mounting in various states with an apparatus body facing various directions, a
20 confirming unit which confirms a direction which the apparatus body faces when the electronic apparatus is mounted on the connecting mounting and a setting unit which sets the electronic apparatus in an operation mode corresponding to the direction of the apparatus
25 body confirmed by the confirming unit.

 According to another aspect of the invention, there is provided an electronic apparatus which is

mounted on a connecting mounting and electrically connected to the connecting mounting, and which electronic apparatus comprises a confirming unit which confirms a direction which a movable holding member
5 faces, the movable holding member being movably mounted on the connecting mounting to face various directions and held by the electronic apparatus, and a mode setting unit which sets the electronic apparatus in an operation mode corresponding to the direction of the
10 movable holding member confirmed by the confirming unit.

According to still another aspect of the invention, there is provided an electronic apparatus which is mounted on a connecting mounting and electri-
15 cally connected to the connecting mounting, and which electronic apparatus comprises an apparatus body, a movable unit movably mounted on the apparatus body, a confirming unit which confirms a direction which the movable unit faces with the apparatus body mounted on
20 the connecting mounting, and a mode setting unit which sets the electronic apparatus in an operation mode corresponding to the direction of the movable unit confirmed by the confirming unit.

According to yet another aspect of the invention,
25 there is provided a connecting mounting for holding an electronic apparatus and being electrically connected to the electronic apparatus, which connecting mounting

comprises a mounting body which is capable of holding the electronic apparatus with a part of the electronic apparatus facing a direction and also holding the electronic apparatus with the part facing other direction, a pair of first connector and a second connector provided in the mounting body, each of the connectors being alternatively movable to a connecting position and to a non-connecting position when the electronic apparatus is mounted on the mounting body, the connectors being connected to an apparatus connector provided in the electronic apparatus at the connecting position when the electronic apparatus is mounted on the mounting body, the first connector being brought to the connecting position and alternatively the second connector being brought to the non-contacting position when the electronic apparatus is mounted on the mounting body with the part of the electronic apparatus facing a direction, the first connector being brought to the non-connecting position and alternatively the second connector being brought to the contacting position when the electronic apparatus is held by the mounting body with the part of the electronic apparatus facing the opposite direction, and a confirming unit which confirms which of the first and second connectors the apparatus connector of the electronic apparatus is connected to.

According to another aspect of the invention,

there is provided an operation mode setting method for an electronic apparatus mounted on a connecting mounting and being electrically connected to the connecting mounting, which method comprises confirming a direction which a part of the electronic apparatus mounted on the connecting mounting faces, and setting the electronic apparatus in an operation mode corresponding to the confirmed direction of the part of the electronic apparatus.

According to still another aspect of the invention, there is provided a computer program for controlling a computer which is installed in an electronic apparatus that is mounted on a connecting mounting and being electrically connected to the connecting mounting, which program comprises making the computer function as a judging unit to judge a direction relative to the connecting mounting which a part of the electronic apparatus mounted on the connecting mounting faces, and making the computer function as a setting unit to set the electronic apparatus in an operation mode corresponding to the direction of the part judged by the judging unit.

According to yet another aspect of the invention, there is provided a connecting system having a connecting mounting, an electronic apparatus mounted on the connecting mounting and being electrically connected to the connecting mounting and a data

processing apparatus for exchanging data with the electronic apparatus through the connecting mounting, which connecting system comprises a holding unit mounted on the connecting mounting, capable of holding
5 the electronic apparatus in various states with a part of the electronic apparatus facing various directions, a judging unit included in the data processing apparatus, which judges a direction relative to the holding unit which the part of the electronic apparatus
10 mounted on the holding unit faces, and a mode setting unit included in the data processing apparatus, which sets the electronic apparatus in an operation mode corresponding to the direction of the part judged by the judging unit, in which mode data are exchanged
15 between the electronic apparatus and the data processing apparatus.

According to still other aspect of the invention, there is provided a data processing apparatus for exchanging data with an electronic apparatus through a
20 connecting mounting, the electronic apparatus being electrically connected to the connecting mounting, which data processing apparatus comprises a judging unit which judges a direction relative to the connecting mounting which a part of the electronic
25 apparatus mounted on connecting mounting faces, and a mode setting unit which sets the data processing apparatus in an operation mode corresponding to the

direction of the part judged by the judging unit, in which mode data are exchanged between the data processing apparatus and the electronic apparatus.

According to yet another aspect of the invention, there is provided an operation mode setting method in a data processing apparatus for exchanging data with an electronic apparatus through a connecting mounting, the electronic apparatus being detachably mounted on the connecting mounting and electrically connected to the connecting mounting when mounted on the connecting mounting, which method comprises judging a direction relative to the connecting mounting a part of the electronic apparatus mounted on the connecting mounting faces, and setting the data processing unit in an operation mode corresponding to the direction of the part judged by the judging unit, in which mode data are exchanged between the data processing apparatus and the electronic apparatus.

Additional objects and advantages of the present invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the present invention.

The objects and advantages of the present invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out hereinafter.

Brief Description of Drawings

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate presently preferred embodiments of the present invention and, together with the general description given above and the detailed description of the preferred embodiments given below, serve to explain the principles of the present invention in which:

FIG. 1 is an external perspective view of a connecting system according to a first embodiment of the invention;

FIG. 2 is a block diagram illustrating circuit configurations of a digital camera and a cradle of the first embodiment;

FIG. 3 is a flow chart showing processes performed by the digital camera when the digital camera is mounted on the cradle;

FIG. 4 is an external perspective view of a connecting system according to a second embodiment of the invention;

FIG. 5 is a view showing a circuit of the cradle;

FIG. 6 is an external perspective view of a connecting system according to a third embodiment of the invention;

FIG. 7 is a block diagram showing a circuit configuration of a digital camera of the third embodiment;

FIG. 8 is a flow chart showing processes performed by the digital camera when the digital camera is mounted on a cradle;

5 FIG. 9 is a block diagram showing a circuit configuration of a personal computer according to a fourth embodiment;

FIG. 10 is a flow chart showing processes performed by the personal computer;

10 FIG. 11 is an external perspective view of a connecting system according to a fifth embodiment of the invention;

FIG. 12A is a cross sectional view illustrating main portions of the cradle and the digital camera before the digital camera is mounted on the cradle;

15 FIG. 12B is a cross sectional view illustrating main portions of the cradle and the digital camera after the digital camera has been mounted on the cradle;

20 FIG. 13 is a view showing a circuit configuration of the cradle;

FIG. 14A is a cross sectional view illustrating main portions of the cradle and the digital camera before the digital camera is mounted on the cradle in a modification of the fifth embodiment;

25 FIG. 14B is a cross sectional view illustrating main portions of the cradle and the digital camera after the digital camera has been mounted on the cradle

in the modification of the fifth embodiment; and

FIG. 15 is a view showing a circuit configuration of a cradle in the modification of the fifth embodiment.

5 Best Mode for Carrying Out the Invention

Embodiments of the present invention will be described with reference to the accompanying drawings.
First Embodiment

10 FIG. 1 is a view illustrating a perspective
external view of a connecting system according to a first embodiment of the invention. The connecting system includes a connecting mounting or a cradle 1 and a digital camera 10 which is mounted on the cradle 1. When mounted on or held by the cradle 1, the digital
15 camera 10 is electrically connected to a personal computer (PC) through the cradle 1 to exchange data therewith.

The cradle 1 has a base 2 and a holding unit 3 mounted on the base 2. The holding unit 3 of the
20 cradle 1 has a structure for slightly tilting the digital camera 10 back to hold therein. The base 2 of the cradle 1 has a first connector 4 in its rear side and a second connector 5 on its top surface, which projects from the top surface and surrounded by the
25 holding unit 3. A cable 50 connected with the personal computer at its one end (not shown) is connected to the first connector 4 of the cradle 1. Terminals of the

first connector 4 are connected to those of the second connector 5 in the base 2, respectively.

5 The digital camera 10 has a body 11, which has a photographing lens 12 on its front face, a liquid crystal display 13 on its rear face and a shutter button 14 on its top surface. The body 11 of the digital camera 10 has a connector 15 on its bottom surface, which is to be connected with the second connector 5 of the cradle 1 when the digital camera is
10 mounted on the cradle 1. In the description hereafter, the second connector 5 and the connector 15 are referred to as a "cradle connector" and a "camera connector," respectively.

In the present embodiment, the cradle connector 5
15 is a male connector and the camera connector 15 is a female connector. When the digital camera 10 is mounted on the cradle 1, the cradle connector 5 and the camera connector 15 are electrically connected with each other. The cradle connector 5 and the camera
20 connector 15 are configured such that both connectors can be connected with each other when the digital camera 10 is held in the cradle 1 with the liquid crystal display 13 facing the front (in the first state) as shown in FIG. 1 and also both connectors can
25 be connected with each other even when the digital camera 10 is held in the cradle 1 with the photographing lens 12 facing the front (in the second

state) (not shown).

More specifically, the cradle connector 5 is located in the center of the holding unit 3 and the camera connector 15 is located in the center of the bottom of the camera body 11. Further, the cradle connector 5 consists of two terminal arrays 5a, 5b, which are disposed in parallel at a front side and a rear side of the base 2 respectively, each including a set of plural connecting terminals arranged in a line. The plural connecting terminals in one of the two sets are arranged in reverse order from the other set and the two sets of the plural connecting terminals are connected to the corresponding connecting terminals of the first connector 4, respectively. Meanwhile, the camera connector 15 has plural connecting terminals which are to be connected with those of either of the terminal arrays 5a, 5b of the cradle connector 5 (not shown).

As described above, the cradle connector 5 and the camera connector 15 can be electrically connected with each other whether the digital camera 10 is set in the first state or in the second state. Further, the cradle connector 5 and the camera connector 15 include detection terminals respectively, each for electrically detecting to which terminal arrays 5a, 5b of the cradle connector 5 the camera connector 15 is connected.

FIG. 2 is a block diagram illustrating circuit

configurations of the digital camera 10 and the cradle 1. The digital camera 10 has a solid-state image-pickup element or CCD 21 and CPU 22. CPU 22 transfers an optical image of a subject produced by a focus lens and a zoom lens (not shown) into an analog image-pickup signal corresponding to the optical image of the subject. CPU 22 has functions of various digital signal processes including image-data compression and expansion using JPEG format, and serves to control the whole operation of the digital camera 10.

CPU 22 is connected with a timing signal generator (TG) 23 for driving CCD 21. TG 23 is connected with a unit circuit 24 to which the image-pickup signal is supplied from CCD 21. The unit circuit 24 includes CDS circuit for correlated-double sampling the image-pickup signal supplied from CCD 21, an automatic gain control amplifier (AGC) for amplifying the sampled image-pickup signal, and an analog digital converter (AD) for converting the analog image-pickup signal into a digital signal. As described above, the image-pickup signal generated by CCD 21 is converted into the digital signal in the unit circuit 24, and the digital signal is further sent to CPU 22.

Further, CPU 22 is connected with a display device 25, a key input unit 26, ROM 27, DRAM 28, a built-in image memory 29, and an input/output interface 30. DRAM 28 is used as a buffer memory for temporarily

storing the digital image data supplied from CCD 21 through the unit circuit 24 and also serves as a working memory for CPU 22. The image data temporarily stored in DRAM 28 is compressed and is finally stored in the built-in image memory 29. The display device 25 includes the liquid crystal display 13 and a driving circuit, and displays a through image of a subject image generated by CCD 21 in a photograph-standby mode and displays image data stored in the built-in image memory 29 in a reproducing mode. The key input unit 26 includes the shutter button 14, plural operation keys such as a power key and a mode selection key (not shown), and outputs to CPU 22 a key input signal corresponding to a key operation by a user.

The input/output interface 30 is connected to the camera connector 15, and through which interface 30 (USB interface or RS-232C interface) data is exchanged under control of CPU 22 between the digital camera 10 and the personal computer connected to the digital camera 10 through the cradle 1.

In ROM 27 are stored a control program which is executed by CPU 22 to control the whole operation of the digital camera 10 and various data which are required for operation of CPU 22. CPU 22 executes the control program to function as a confirming unit and a setting unit.

FIG. 3 is a flow chart showing processes performed

in the digital camera 10, the power of which has been turned on and which is mounted on the cradle 1 connected to the personal computer through the communication cable 50.

5 When the digital camera 10 is mounted on the cradle 1, CPU 22 judges to which terminal arrays 5a, 5b of the cradle connector 5 the camera connector 15 is connected, and confirms at Step SA1 whether the digital camera 10 is mounted on the cradle 1 in the first state
10 or in the second state.

 When it is confirmed at Step SA2 that the digital camera 10 is mounted on the cradle 1 in the first state or that the digital camera 10 is mounted on the cradle 1 with the liquid crystal display 13 facing the front
15 as shown in FIG. 1, CPU 22 sets the operation mode to a recorded image-data transferring mode and starts its operation in the recorded image-data transferring mode at Step SA3. CPU 22 reads out image data (image files) from the built-in image memory 29 in a predetermined
20 order and transfers the read out image data to the personal computer at Step SA4. CPU 22 continues reading out and transferring the image data to the personal computer until all the image data have been transferred to the personal computer, and finishes the
25 operation in the recorded image-data transferring mode when all the image data have been transferred to the personal computer (Step SA5: YES).

Meanwhile, when it is confirmed that the digital camera 10 is mounted on the cradle 1 with the photographing lens 12 facing the front or set in the second state (Step SA2: NO), CPU 22 sets the operation to a PC camera mode and starts its operation in the PC camera mode at Step SA6. An image of a subject is photographed using CCD 21 at Step SA7, and the generated image data are successively sent to the personal computer at Step SA8. CPU 22 continues performing the operation in the PC camera mode until a key manipulation is performed on the digital camera or on the personal computer by the user to stop performing the operation in the PC camera mode, and CPU 22 finishes the operation in the PC camera mode when such key manipulation is performed (Step SA9: YES).

As described above, when the user uses a data communication function between the digital camera 10 mounted on the cradle 1 and the personal computer, the user simply can set his/her desired operation mode (the recorded image-data transferring mode or the PC camera mode) of the digital camera 10 by selectively setting the digital camera 10 in the cradle 1 in the first state or in the second state. In other words, the user can set the operation mode in a very simple way to use the data communication function.

In the present embodiment set forth above, the holding unit 3 of the cradle 1 is configured so as to

hold the digital camera 10 in a slightly backward tilting state, and the states in which the digital camera 10 is held in the cradle 1 have a certain relationship with the operation mode of the digital camera 10. That is, the operation mode of the digital camera 10 is set to the recorded image-data transferring mode when the digital camera 10 is set to the cradle with the liquid crystal display 13 facing the front, and the operation mode of the digital camera 10 is set to the PC camera mode when the digital camera 10 is set to the cradle with the photographing lens 12 facing the front.

As the cradle 1 is configured as set forth above, the user easily can monitor images displayed on the liquid crystal display 13 in the recorded image-data transferring mode, and the user can fix an appropriate photographing condition in the PC camera mode since the digital camera 10 is held with the photographing lens tilted back.

Further in the present embodiment, when the digital camera 10 with the power being turned on is mounted on the cradle 1, the digital camera 10 automatically works in the recorded image-data transferring mode or in the PC camera mode, but the digital camera may be designed such that the power is automatically turned on at the time when the digital camera 10 is mounted on the cradle 1 and the camera

connector 15 is connected to the cradle connector 5.

Further in the digital camera 10 according to the present embodiment, the operation mode of the digital camera 10 is selectively set to the recorded image-data transferring mode or to the PC camera mode depending on the state in which the digital camera 10 is mounted on the cradle 1, but the digital camera 10 may be designed to be set to an operation mode other than the operation modes such as the recorded image-data transferring mode and the PC camera mode. For example, the digital camera 10 may be designed to work in the operation modes of any kind or operation whatsoever, such as a charging mode and an image-data transferring mode, the charging mode and a setting mode (a customizing mode) in which the digital camera is set to a user's desired mode, a self timer mode and the image-data transferring mode, a music reproducing mode and a music-data and image-data transferring mode.

Second Embodiment

FIG. 4 is a view illustrating a perspective external view of a connecting system according to a second embodiment of the invention. The connecting system includes a connecting mounting or a cradle 101 and a digital camera 10 which is mounted on the cradle 1. When held by or mounted on the cradle 1, the digital camera 10 is electrically connected to a personal computer (PC) through the cradle 101 to

exchange data therewith.

The cradle 101 has a base 102 in the top of which a round opening 102a is formed, and a rotating round table 106 which is rotatably mounted within the round opening 102a. The rotatable round table 106 is a moving member of the connecting system of the invention, and on the top surface of the rotatable round table 102 is provided a holding unit 103. The rotatable table 106 is allowed to rotate in a horizontal plane parallel to the base 102 by more than 180 degrees, and has a projection 106a on its peripheral surface.

A first connector 104 is provided in a rear face of the base 102, and a second connector 105 is mounted on the rotatable round table 106 within the holding unit 103. The connecting terminals of the first connector 104 are connected to the corresponding connecting terminals of the second connector 105 in the base 102. Meanwhile, the second connector 105 has a detecting terminal 105a in addition to the connecting terminals for data communication as shown in FIG. 5. The detecting terminal 105a detects a rotational position of the rotatable round table 106. An on-off switch 107 is integrally provided to the connecting connector 104 and is used to close or open a circuit between the detecting terminal 105a and a predetermined data communication terminal 105b. The on-off switch

107 is a micro-switch which is operated by the projection 106a mounted on the rotatable round table 106. The micro-switch is depressed by the projection 106a to make the circuit when the rotatable round table 106 rotates by a predetermined angle as indicated in dotted lines in FIG. 4.

The external view and the circuit configuration of the digital camera 10 according to the second embodiment are similar to the first embodiment.

In the second embodiment, when the digital camera 10, the power of which is turned on, is set to the cradle 101 connected to the personal computer (PC) through the communication cable 50, the digital camera 10 works as described below.

In the digital camera 10, CPU 22 detects an output at the second connector 105 of the cradle 101 that is connected to the personal computer through the communication cable 50, to judge whether the on-off switch 107 is closed or open and to determine whether the digital camera 10 mounted on the holding unit 103 is held by the base 102 of the cradle 101 with the liquid crystal display 13 facing the front or facing the rear.

When the on-off switch 107 is closed or on, and when the digital camera 10 is held on the cradle 101 with the liquid crystal display 13 facing the front as shown in FIG. 4, the digital camera 10 is automatically

set to the recorded image-data transferring mode and all the image data (image files) stored in the built-in memory 29 are transferred to the personal computer in a similar way in the processes performed at Steps SA3 through SA5 of FIG. 3. Meanwhile, when the on-off switch 107 is open or off, and when the digital camera is held on the cradle 101 with the liquid crystal display 13 facing the rear, the digital camera is automatically set to the PC camera mode and image data generated with CCD 21 are successively sent to the personal computer until a key is manipulated to stop performing the operation in the PC camera mode.

As described above, when the user uses the data communication function between the digital camera 10 held on the cradle 101 and the personal computer, the user can set the digital camera 10 to his/her desired operation mode (the recorded image-data transferring mode or the PC camera mode) by selectively changing the direction of the digital camera 10 relative to the base 102 of the cradle 101 by rotating the rotatable round table 106 on which the digital camera 10 is mounted. Therefore, when using the data communication function, the user can set the operation mode in a very simple manner. Further, according to the cradle 101 of the second embodiment, the operation mode can be set with the digital camera 10 mounted on the cradle 101. The cradle 101 can be used conveniently, because the user

is not required to set the digital camera 10 to the cradle 101 every time the operation mode is changed.

Further, the cradle 101 can be modified as follows. That is, plural detecting switches are
5 provided on the base 102 at plural positions to detect the rotational position of the projection 106a of the rotatable round table 106, which allows the digital camera 10 held on the rotatable table 106 to face in plural directions. Using the structure of the cradle
10 101, plural operation modes may be set to the digital camera 10 by selectively rotating the rotatable table 106.

In the second embodiment, when the digital camera 10 with the power being turned on is installed on the
15 cradle 101, the digital camera 10 automatically works in the recorded image-data transferring mode or in the PC camera mode, but the digital camera may be configured such that the power is automatically turned on at the time when the digital camera 10 is installed
20 on the cradle 101 and when the camera connector 15 is connected to the cradle connector 105.

Further in the digital camera 10 according to the second embodiment, the operation mode of the digital camera 10 is selectively set to the recorded image-data
25 transferring mode or to the PC camera mode depending on the rotational position of the rotatable table 106 on which the digital camera 10 is mounted, but the digital

camera 10 may be configured to be set to an operation mode other than the data communication mode, as described in the first embodiment.

Third Embodiment

5 FIG. 6 is a view illustrating a perspective external view of a connecting system according to a third embodiment of the invention. The connecting system includes a connecting mounting or a cradle 201 and a digital camera 210 which is mounted on the cradle
10 201. When held by or mounted on the cradle 201, the digital camera 210 is electrically connected to a personal computer (PC) through the cradle 201 to exchange data therewith.

 The cradle 201 in the third embodiment is of a
15 substantially same structure as the first embodiment, but is different from the first embodiment in that a second connector 205 provided within the holding unit 3 has only one set of data communication terminals.

 The digital camera 210 in the third embodiment is
20 different from those of the first and the second embodiments. The digital camera 210 has a movable portion 211 on a side wall of the camera body 11. More specifically, the movable portion 211 is rotatably mounted on the side wall about an axis "O" which
25 penetrates through the camera body 11 from the side wall to other side wall, as illustrated in broken lines in FIG. 6. The movable portion 211 is rotatable about

the axis more than 180 degrees (for example, 270 degrees), and has the photographing lens 12 and CCD 21. A connector 215 is provided in the bottom surface of the camera body 11 and corresponds to a second
5 connector 205 provided on the cradle 201. The connector 215 is electrically connected to the second connector 225, when the camera body 11 is mounted on the holding unit 3 of the cradle 201 with the liquid crystal display 13 facing the front of the cradle 201
10 as shown in FIG. 6. In the description below, the second connector 205 of the cradle 201 is referred to as a cradle connector and the connector 215 of the digital camera 210 is referred to as a camera connector only for a simplicity purpose.

15 The digital camera 210 has a direction detecting unit 212 for detecting a photographing direction as shown in FIG. 7. The direction detecting unit 211 detects the direction of the photographing lens 12, and includes a detecting switch (not shown) which is made
20 to close when the movable portion 211 is held with the photographing lens 121 facing the front of the cradle 210 or facing the same direction as the liquid crystal display 13 of the camera body 11, and a circuit which sends to CPU 22 a detection signal that indicating the
25 photographing direction when the movable portion 211 is held with the photographing lens 12 facing the front. The connecting system according to the third embodiment

has the similar construction to the first and the second embodiments except mentioned above.

5 In the third embodiment, when the digital camera 210, the power of which is turned on, is set to the cradle 201 connected to the personal computer (PC) through the communication cable 50, the digital camera 210 works in accordance with the flow chart shown in FIG. 8.

10 When the camera connector 215 is connected to cradle connector 205, the digital camera 210 detects depending on the detection signal output from the direction detecting unit 212 at Step SB1 to which direction the photographing lens 12 faces. When the detection switch of the direction detecting unit 212 is
15 off and the photographing lens 12 faces the front of the camera body 11 and the rear of the cradle 201 (Step SB2: YES), CPU 22 sets the operation mode to the recorded image-data transferring mode and starts performing the operation in the recorded image-data
20 transferring mode at Step SB3. CPU 22 reads out image data (image files) from the built-in image memory 29 in a predetermined order and transfers the read out image data to the personal computer at Step SB4. CPU 22 continues reading out and transferring the image data
25 to the personal computer until all the image data have been transferred to the personal computer, and finishes the operation in the recorded image-data transferring

mode when all the image data have been transferred to the personal computer (Step SB5: YES).

Meanwhile, when it is confirmed that the movable portion 211 is held with the photographing lens 12 facing the rear of the camera body 11 and the front of the cradle 201 as shown in FIG. 6 (Step SB2: NO), CPU 22 sets the operation to a PC camera mode and starts its operation in the PC camera mode at Step SB6. An image of a subject is photographed using CCD 21 at Step SB7, and the generated image data are reversed upside down at Step SB8, and then successively sent to the personal computer at Step SB9. CPU 22 continues performing the operation in the PC camera mode until a key manipulation is performed on the digital camera 210 or on the personal computer by the user to stop performing the operation in the PC camera mode, and CPU 22 finishes the operation in the PC camera mode when such key manipulation is performed (Step SB10: YES).

As described above, when the user uses a data communication function between the digital camera 210 mounted on the cradle 201 and the personal computer, the user simply can set his/her desired operation mode (the recorded image-data transferring mode or the PC camera mode) of the digital camera 210 by selectively rotating the movable portion 211 (the photographing lens 12) of the digital camera 210. In other words, the user can set the operation mode in a very simple

way to use the data communication function. The digital camera 210 has an advantage similar to the second embodiment that the operation mode can be changed with the digital camera 210 installed in the cradle 201.

If the digital camera 210 has a detection switch which can detect plural directions of the movable portion 211 (the photographing lens 12), and the digital camera 210 can detect the plural directions of the movable portion 211 relative to the cradle 201. The digital camera 210 having the above detection switch can be set to more than three operation modes depending on the directions of the photographing lens 12.

In the second embodiment, when the digital camera 210 with the power being turned on is installed on the cradle 201, the digital camera 210 automatically works in the recorded image-data transferring mode or in the PC camera mode, but the digital camera may be configured such that the power is automatically turned on at the time when the digital camera 210 is installed on the cradle 201 and when the camera connector 215 is connected to the cradle connector 205.

Further in the digital camera 210 according to the third embodiment, the operation mode of the digital camera 210 is selectively set to the recorded image-data transferring mode or to the PC camera mode

depending on the directions of the movable portion 211 of the digital camera 210, but the digital camera 10 may be designed to be set to an operation mode other than the data communication mode, as described in the first and the second embodiments.

Fourth Embodiment

In a forth embodiment, a personal computer (PC) is described, which serves as a data processing apparatus of the present invention that exchanges data with the digital camera 10 through the cradle 1 described in the first embodiment.

FIG. 9 is a block diagram illustrating a circuit configuration of the personal computer 301 according to the fourth embodiment. The personal computer 301 has CPU 302, RAM 303, a storage 304, an input-output interface 305, an input devices 306 such as a keyboard and a mouse, a display device 307 such as LCD and CRT, and a modem 308 for connecting to the Internet through the telephone lines.

The input-output interface 305 is connected to a connector 309, to which the communication cable 50 (shown in FIG. 1) is connected. The input/output interface 305 is connected to the digital camera 10, and through which interface 305 (USB interface or RS-232C interface) data is exchanged under control of CPU 22 between the digital camera 10 and the personal computer 301 connected to the digital camera 10 through

the cradle 1. The storage is a hard disc drive with a comparatively large storage capacity.

An operating system and plural application programs are stored in the storage 304. In the fourth embodiment, a cradle program which comes with the cradle 1, an image-data take-in program for taking in image data, and an image-data upload program are stored in the storage 304. The image-data upload program is used to successively upload images to a web site on the Internet such as user's home page, which images are taken in with the digital camera 10, which is used as a personal computer camera (a Web camera). Further in the fourth embodiment, CPU 302 works under the cradle program to function as a confirming unit and a setting unit.

Now, the operation of the personal computer 301 will be described with reference to the flow chart shown in FIG. 10. It is assumed that the personal computer 301 is connected to the cradle 1 with the digital camera 10 installed and has started up with the cradle program remaining, and that a start-up program has been set to the cradle program as will be set forth later.

When the personal computer 301 is installed in the cradle 1, CPU 302 electrically judges which terminal arrays 5a, 5b of the cradle connector 5 the connecting terminals of the camera connector 15 are connected to,

and determines at Step SC1 whether the digital camera 10 is installed in the cradle 1 with the liquid crystal display 13 facing the front (first direction, shown in FIG. 1) or with the photographing lens 12 facing the front (second direction).

When it is determined at Step SC2 (YES) that the digital camera 10 is installed in the cradle 1 with the liquid crystal display 13 facing the front (the first direction), CPU 302 makes the image-data take-in program start up and begins to store image data transferred from the digital camera 10 in a predetermined area in the storage 304 at Step SC3. Thereafter, CPU 302 continues storing in the storage 304 image data transferred from the digital camera 10 at Step SC4. When CPU 302 receives from the digital camera 10 a signal indicating that all the image data have been transferred (Step SC5: YES), the operation under the data program finishes.

Meanwhile, when it is determined at Step SC2 (NO) that the digital camera 10 is installed in the cradle 1 with the photographing lens 12 facing front (second direction), CPU 302 makes the image-data upload program start up at Step SC6. Further, CPU 302 receives image data successively transferred from the digital camera 10. On the other hand, CPU 302 prepares to reach to the Internet through the modem 308 and uploads the picked-up image data to the Internet through the modem

308 at Step SC7. Upon the user's stop-operation, the operation under the image-data upload program finishes (Step SC8: YES).

5 In the fourth embodiment, requiring no user's troublesome manipulation the personal computer 301 automatically performs an image-data receiving operation or an internet-upload operation depending on whether the digital camera 10 is installed with the liquid crystal display facing 13 the front or with the photographing lens 13 facing the front. The fourth
10 embodiment allows the user to exchange image data between the personal computer 301 and the digital camera 10 in a very simple manner.

In the fourth embodiment, the personal computer
15 301 selectively performs the image-data receiving operation or the internet-upload operation. But it may be possible to store a program other than the application programs set forth above in the storage 304 and to make the personal computer 301 perform a data
20 communication operation different from those set forth above. For example, it may be useful to make the personal computer 301 transfer data or image data stored in the storage 304 to the digital camera 10 and to make the digital camera 10 store the data or the
25 image data in the built-in memory 29. In the fourth embodiment, the personal computer which is connected to the cradle 1 of the first embodiment is described, but

the personal computer, which is connected to the cradle 101 of the second embodiment or the cradle 201 of the third embodiment, will show similar advantages.

Further in the fourth embodiment, the digital
5 camera 10 has the function to judge whether the camera 10 itself is installed in the cradle 1 with the liquid crystal display 13 facing the front or with the photographing lens facing the front and to
10 automatically set the recorded image-data transferring mode or the personal camera mode depending on the result of the judgment, and the personal computer 301 judges whether the camera 10 is installed in the cradle 1 with the liquid crystal display 13 facing the front or with the photographing lens 12 facing the front and
15 automatically selects the application program depending on the result of the judgment. But it may be possible to store a cradle program different from the cradle program described in the fourth embodiment and to make the personal computer 301 perform operations set forth
20 below.

For instance, before or after the image-data take-in program or the image-data upload program starts up at Step SC3 or SC6, it may be possible to send a request signal for setting the recorded-image
25 transferring mode to the digital camera 10 through the cradle 1, when the digital camera 10 is installed with the liquid crystal display facing 13 the front, and to

send a request signal for setting the PC camera mode to the digital camera 10 through the cradle 1, when the digital camera 10 is installed with the photographing lens 13 facing the front. That is, the CPU 302 and the input-output interface 30 may be configured to function as an operation request unit of the present invention.

In this case, a program, which controls CPU 22 to set the operation mode in response to the request signal set forth above, is stored in ROM 27 of the digital camera 10, and the same advantages of the fourth embodiment will be obtained.

Fifth Embodiment

FIG. 11 is a view illustrating a perspective external view of a connecting system according to a fifth embodiment of the invention. The connecting system includes a connecting mounting or a cradle 401 and a digital camera 410 which is mounted on the cradle 401. When mounted on the cradle 401, the digital camera 410 is electrically connected to a personal computer (PC) through the cradle 401 to exchange data therewith.

The cradle 401 has a base housing 402 and a holding unit 403 mounted on the top of the base housing 402. The holding unit 403 mounted on the base housing 402 receives and holds the digital camera 410 with being slightly tilted back. The base housing 402 has a first connector 404 on its rear side, to which

connector 404 the communication cable 50 is connected.
The communication cable 50 is also connected to a
personal computer (not shown) at other end.

5 A pair of rectangular holes 402a and 402b are
formed in the top surface of the base housing 402 of
the cradle 401 on an imaginary line parallel with the
front edge of the base housing 402 and within an area
surrounded by the holding unit 403.

As shown in a cross-sectional views of FIGS. 12A
10 and 12B, within the base housing 402 a supporting axis
406 is provided running across perpendicular to the
imaginary line between the pair of rectangular holes
402a, 402b. A movable elongated member 407 is
rotatably supported on the supporting axis 406. The
15 movable elongated member 407 has second connectors
405a, 405b on its both end portions, which connectors
405a and 05b are connected to the first connector 404
in the rear side of the base housing 402. The movable
elongated member 407 is of a shape in a way that its
20 both ends are slightly bent down. When the movable
member 407 is turned about the supporting axis 406 in
the counter clockwise direction, the connector 405b on
one end of the movable member 407 penetrates through
the rectangular hole 402b formed in the tope surface of
25 the base housing 402, appearing within the holding
member 403 and the connector 405a on the other end on
the movable member 407 recedes from the rectangular

hole 402a, as shown in FIG. 12A. On the contrary, when the movable member 407 is turned about the supporting axis 406 in the clockwise direction, the connector 405a on one end of the movable member 407 penetrates through the rectangular hole 402a formed in the top surface of the base housing 402, appearing within the holding member 403 and the connector 405b on the other end of the movable member 407 recedes from the rectangular hole 402b, as shown in FIG. 12B. In short, the connectors 405a and 405b are alternatively appear from the rectangular holes 402a and 402b of the base housing 402, every time when the movable member 407 is turned about the supporting axis 406 in the clockwise direction or in the counter-clockwise direction.

FIG. 13 is a view showing a circuit configuration of the cradle 401. The connectors 405a, 405b have plural terminals "1," "2," through "n," respectively, and these terminals are connected to each other, except the n-th terminals, and are connected to a circuit board 501, and are further connected to the first connector 404 through the circuit board 501, as shown in FIG. 13. An AC adapter is connected to the circuit board 501 through either of the second connectors 405a, 405b for supplying the power to the digital camera 410. The n-th terminal of each of the second connectors 405a, 405b is connected to a terminal (data communication terminal) of other number of other

connector 405a or 405b. The terminals of the second connectors 405a, 405b are connected to the movable member 407 in a reverse order to each other.

5 Similarly to those described in the first and second embodiments, the digital camera 410 in the fifth embodiment has the photographing lens 12 on the front surface of the camera body 11, the liquid crystal display 13 on its rear surface, the shutter button 14 on the top, and a female connector 415 in the bottom.

10 In the present embodiment, it should be noted that the digital camera 410 has the female connector 415 in the portion of the bottom that corresponds to either of the rectangular holes 402a and 402b of the base housing 402, when the digital camera 410 is mounted on the
15 holding unit 403. More specifically, when the digital camera 410 is held with the liquid crystal display 13 facing the front by the cradle 401 as shown in FIG. 11, the female connector 415 of the digital camera 410 faces the rectangular hole 402b, and when the digital
20 camera 410 is held with the photographing lens 12 facing the front by the cradle 401 as shown in FIGS. 12A and 12B, the female connector 415 of the digital camera 410 faces the rectangular hole 402a.

25 The digital camera 410 has the similar circuit configuration to those of the first and the second embodiments, but the female connector 415 of the digital camera 410 includes a power-supply terminal

connected to a power unit (not shown) of the camera 410 unit.

In the connecting system of the present embodiment, when the digital camera 410 is mounted on the cradle 401 with the liquid crystal display 13 facing the front as shown in FIG. 11 (the first direction), the second connector 405a of the movable member 407 is pushed back into the base housing 402 by the camera body 11 and the other second connector 405b is pushed into the female connector 415 of the digital camera 410 to be electrically connected therewith. On the contrary, when the digital camera 410 is mounted on the cradle 401 with the photographing lens 12 facing the front as shown in FIGS. 12A and 12B (the second direction), the second connector 405b of the movable member 407 is pushed back into the base housing 402 by the camera body 11 and the other second connector 405a is pushed into the female connector 415 of the digital camera 410 to be electrically connected therewith. In short, whether the digital camera 410 is held with the liquid crystal display 13 facing the front or with the photographing lens 12 facing the front, the digital camera 410 is electrically connected with the cradle 401 through either of the second connectors 405a and 405b.

When the digital camera 410 according to the fifth embodiment is installed in the cradle 401 with power

being on, the following operation is performed.

It is electrically detected to which number of data communication terminal the detection terminal (n-th terminal) is connected in order to determine to which second connector (cradle connectors) 405a or 405b the female connector (camera connector) 415 is connected. When it is determined that the digital camera 410 is mounted on the cradle 401 with the liquid crystal display 13 facing the front as shown in FIG. 11, the digital camera 410 is automatically set to the recorded image-data transferring mode in a similar way as described with reference to Steps SA3 through SA5 shown in FIG. 3. In the recorded-image transferring mode, all the image data (image files) stored in the built-in memory 29 are transferred to the personal computer. Meanwhile, when the digital camera 410 is mounted on the cradle 401 with the liquid crystal display 13 facing the rear as shown in FIGS. 12A and 12B, the digital camera 410 is automatically set to the PC camera mode in a similar way as described with reference to Steps SA6 through SA9 shown in FIG. 3. In the PC camera mode, all the generated image data are successively transferred to the personal computer until a stop operation is performed.

As described above, the user can selectively set his/her desired operation mode (the recorded image-data

transferring mode or the PC camera mode) simply by installing the digital camera 410 in the cradle 401 with the liquid crystal display 13 facing the front or facing the rear.

5 The fifth embodiment provides an easy to use cradle. That is, simply by installing the digital camera 410 onto the cradle 401, the user can bring either of the second connectors 405a, 405b of the cradle 401 to a connection position where the second
10 connector is connected to the female connector 415 of the digital camera 410 and simultaneously bring other second connector to a withdrawn position in the base housing 402. It may be possible to configure the cradle such that the second connectors 405a and 405b
15 are independently movable to the connection position or to the withdrawn position, and the second connectors are selectively connected to the female connector of the digital camera 410 by user's manual operation. The above modification will retain feature and improved
20 usability of the digital camera and the cradle.

 In the present fifth embodiment, when the digital camera 410 with the power being turned on is installed on the cradle 401, the digital camera 10 automatically works in the recorded image-data transferring mode or
25 in the PC camera mode, but the digital camera may be configured such that the power is automatically turned on at the time when the digital camera 410 is installed

on the cradle 401 and when the camera connector 415 is connected to either of the second connectors 405a, 405b.

Further in the digital camera 410 according to the present embodiment, the operation mode of the digital camera 410 is selectively set to the recorded image-data transferring mode or to the PC camera mode depending on the state in which the digital camera 410 is installed on the cradle 401, but the digital camera 410 may be configured to be set to an operation mode other than the operation modes such as the recorded image-data transferring mode and the PC camera mode.

In the fifth embodiment, the detection terminal (n-th terminal) included in each of the second connectors 405a, 405b is connected to a terminal (data communication terminal) having a different number of the other second connector, and when the digital camera 410 is installed in the cradle 401, it is confirmed to which second connector 405a or 405b the connector 415 of the digital camera 410 is connected by electrically detecting to what number of the terminal the detection terminal (n-th terminal) is connected. But modification may be made to the structure of the cradle 401 as described below.

As shown in FIG. 14A and FIG. 14B, there are provided two detection switches (normal open micro-switches) 511a, 511b beneath both ends of the movable

member 407 within the base housing 402 of the cradle 401. The detection switches 511a, 511b are normal open micro-switches for detecting which the second connectors 405a or 405b is withdrawn into the base housing 402. The detection switches are located at positions respectively, where either of the switches is depressed to make the circuit by either of the ends of the movable member 407 when the same is turned in the clockwise or the counter-clockwise direction. As shown in a circuit diagram of FIG. 15, the detection terminals (n-th terminals) of the second connectors 405a, 405b are connected to the circuit board 501 through the detection switches 511a, 511b, respectively. When the switches 405a, 405b are closed, the power of different voltage levels are applied from the circuit board 501 to the detection terminals.

In the modification, when the digital camera 410 is installed in the cradle 401, it is judged depending on the voltage level applied to the second connector 405a or 405b, which the second connector 405a or 405b the connector 415 of the digital camera 410 is connected to and it is confirmed that the digital camera 410 is installed with the liquid crystal display facing the front or the rear.

In each of the embodiments, the digital camera connected to the personal computer through the cradle has been described, but the present invention may be

applied to other mobile electronic devices such as a personal digital assistant, cellular phones, etc. and to a connecting system having the above electronic devices and a cradle electrically connected to the devices. The embodiments including the personal computer as a data processing apparatus have been described, but the present invention may be applied to a system including a connecting mounting electrically connected to the above electronic device and other electronic device which exchanges data with the former electronic device. The present invention may be applied to a connecting system including the digital camera and a color printer. For example, by installing the digital camera on the cradle in a certain direction, it is possible to make the color printer print an image data sent to the color printer or a list of images.

Further modification and variation can be made to the disclosed embodiments without departing from the subject and spirit of the invention as defined in the following claims. Such modification and variations, as included within the scope of these claims, are meant to be considered part of the invention as described.